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Comparison of physical activity, internet addiction, and healthy lifestyle behavior of Turkish University students before and during the early COVID-19 Pandemic

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ABSTRACT

Aims: This study aims to compare the physical activity, internet addiction and healthy lifestyle behaviors of university students before and during the coronavirus pandemic.

Methods: This study, which included university students, was carried out in two stages observational, cross-over, and before-after evaluation. After the physical and sociodemographic characteristics of 335 university students were recorded in the first stage before the pandemic (February-May 2019), The International Physical Activity Questionnaire (IPAQ), the Internet Addiction Scale (IAS) and Healthy Lifestyle Behavior Scale (HLBS) were applied in the study. The second part of the study consists of repeating questionnaires online with 205 students during the pandemic (June 2020).

Results: It was determined that there was a decrease in the levels of vigorous (MD: 28.4; p<0.001) and moderate (MD: 47.7; p<0.001) physical activity of the participants, and an increase in the time they spent sitting (MD: -178.1; p<0.001), internet addiction (MD: 31.7; p<0.001), and HLBS total score (MD: -6.82; p<0.001).

Conclusion: It was observed that the pandemic negatively affected physical activity, internet addiction, and healthy lifestyle behavior. It is essential to determine whether these effects continue after the pandemic and to take precautions accordingly.

Keywords: Physical activity, internet addiction, health behavior, COVID-19 pandemic

INTRODUCTION

In Wuhan, China, COVID-19 infection caused by the novel coronavirus type (SARS-COV-2) was detected in December 2019.[1] The virus, which spread to the whole world, especially Europe and America quickly, was defined as a new coronavirus that had not been detected in humans before on January 7, 2020. On March 11, 2020, the World Health Organization classified it as a pandemic.[2] In Turkey, the first case with a diagnosis of COVID-19 was announced by the Ministry of Health on March 11, 2020.[3] After this date, various measures have been taken by the State of the Republic of Turkey to protect public health and reduce the risk of disease transmission.[4] These measures can be listed as the closure of universities, the transition to online education, travel restrictions, preventing certain age groups from going out on the streets and declaring a weekend curfew. Undoubtedly, this situation causes an increase in the time spent at home and in front of the screen, especially in university students, and may adversely affect the physical activity behaviors, sleep patterns, quality of life and healthy lifestyle behaviors of individuals.[1-3, 5-7]

Many studies in the literature examine problematic internet use, exercise and healthy lifestyle behaviors in university students and adolescents.[8,9] Studies are primarily aimed at determining the relationship between the duration of internet use and depression, stress management, academic achievement or healthy lifestyle behaviors.10 Although these studies reflect pre-pandemic data, there are also studies conducted during the pandemic that examine the effects on internet use, depression, and healthy lifestyle behaviors.[1-11] However, according to our literature review, no study compares the levels of physical activity, internet addiction and healthy lifestyle behaviors before and during the pandemic.

It is thought that the COVID-19 pandemic in young individuals may directly impact physical activity, internet addiction and healthy lifestyle behaviors. However, the effects of COVID-19 on physical activity and internet addiction are uncertain compared to the pre-pandemic period. This study aims to compare the physical activity, internet addiction and

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healthy lifestyle behaviors of young individuals before and during the COVID-19 pandemic.

METHODS

Design

This study was carried out on university students and was carried out as observational, cross-over, before-after evaluation. Volunteer university students aged 19-24, with a body mass index of 18.50-24.99 kg/m^2, without any chronic disease or disability, and who did not use alcohol, drugs or cigarettes were included in the study. Failure to complete the questionnaire, being actively suffering from COVID-19, having a physical or metabolic disease that would prevent physical activity, and having a BMI above 35 were the reasons for exclusion.

Evaluations in the study consisted of two time points. In the first evaluation, face-to-face questionnaires were applied to 335 participants in the pre-pandemic period (February-May 2019), assessing physical activity level, internet addiction, and healthy lifestyle behaviors. The second assessment consisted of repeating the same questionnaires during the pandemic (June 2020). The second evaluation was carried out with 205 of 335 respondents who responded to online questionnaires.

The study was carried out with the permission of the Gazi University Scientific Researches Evaluation and Ethics Committee (Date: 10.11.2020 Decision No: 129778) and the Ministry of Health of the Republic of Turkey (2021-06-10T23-03-50). We obtained an informed consent form from all patients for procedure. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Instruments and Procedures

Sociodemographic Information Form

Sociodemographic data, including gender, age, weight, height, residence during the academic year were gathered using a personalized, self-administered questionnaire.

International Physical Activity Questionnaire - Short Form

The International Physical Activity Questionnaire - Short Form (IPAQ-SF), which has seven questions, was used to measure physical activity. The total weekly physical activity minutes and daily sitting time was determined using the questionnaire.[6] Sağlam et al.[12] performed a validity and reliability analysis of the IPAQ-SF in Turkey in 2010.

Internet Addiction Scale (IAS)

Internet Addiction Scale (IAS) was developed by Young[13] and translated into Turkish by Kesici et al.[14] This scale measures at the way that internet use has affected people's levels of obsessive compulsive behavior, emotional changes, behavioral issues, and overall quality of life.

Higher scores indicate a greater propensity for addiction. The 20 items of the IAS are calibrated scores from 1 to 5, with a total score range of 20 to 100. Three categories of internet user groups are identified in Young's the original design. Internet addicts, possible internet addicts, and non-addicts, in that order, are those whose IAS scores are over 70, between 40 and 69, and below 39.[14]

Healthy Lifestyle Behavior Scale

The healthy lifestyle behaviors scale (HLBS) scale was developed by Walker et al.[15] in 1987 and revised in 1996. The scale measures the health-promoting behaviors of the individual about the healthy lifestyle behavior. The scale includes a total of 52 items that make up the six sub-parameters (Health responsibility, Physical activity, Nutrition, Spiritual development, Interpersonal relationships, Stress management) of HLBS. In this scale, which is a four-point Likert type, the answers given to each item are scored as never "1", sometimes "2", often "3", and regularly "4". Total scores are obtained by summing all the items for the scale. The lowest total score to be taken from the scale was "52", and the highest score was "208".[15] The Turkish validity and reliability study was conducted by Bahar et al.[16] in 2008.

Statistical Analysis

The analysis of the obtained data was performed using the "Statistical Package for Social Sciences" (SPSS) Version 22.0 (SPSS inc. Chicago, II, USA) program. Mean, standard deviation, and mean differences were used for the presentation of continuous variables (quantitative variables) obtained by measurement, and frequency and percentage values were used for the presentation of categorical variables (qualitative variables). Shapiro Wilk test and graphical methods were used to investigate the conformity of quantitative variables to normal distribution. The measurements of the same individuals were different before and during the pandemic was examined with the Wilcoxon test for non-normally distributed variables.

The sample size was calculated using GPower 3.1 program based on the physical activity as the primary outcome measure. Based on similar studies[5,6] the number of participants was determined to be at least 208 with 90% power, 5% type 1 error, and 0.20 effect size.

RESULTS

trength, improving the biomechanics of daily life and sports-specific movements such as walking, running, jumping. If the patient is an athlete, return to sports should be planned after the criterias met.

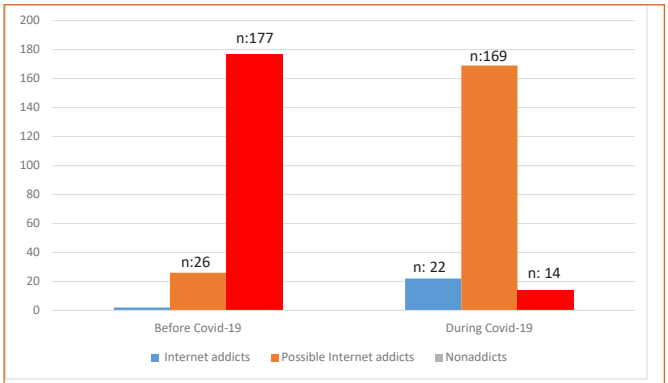
Two hundred five university students with a mean age of 21.7 (SD = 1.7) participated in this study. 66.3% (136) of the participants were female, 33.7% (69) were male, 60% (123) had a garden, etc. while living in a house, 40% (82) lived in an apartment. The remaining demographics are shown in Table 1.

Table 1. Sociodemographic characteristics of the subjects

	Included Subjects (n:205)
Age (years) (X±SD)	21.7±1.7
BMI (kg/m^2) (X±SD)	22.2±3.5
Gender n (%)	
Male	69 (33.7)
Female	136 (66.3)
Year of study n (%)	
First year	31 (15.1)
Second year	38 (18.5)
Third year	78 (38.0)
Fourth year	58 (28.3)
Type of living n (%)	
In a house with a garden or yard	82 (40.0)
In an apartment/a house with no garden or yard	123 (60.0)
Environment n (%)	
Urban	122 (59.5)
Rural	64 (31.2)
Suburban	19 (9.3)

At the first time point, students were in their everyday living and working environments. In contrast, at the second time point, there was a situation where their social and environmental environments were limited due to quarantine and pandemic. Weekly physical activity time as well as weekly sitting time were analyzed and compared at both time points by analyzing the results of the IPAQ questionnaire. Statistics of participants compared to pre-pandemic periods of vigorous (MD: 28.4) and moderate (MD: 47.7) exercise and walking (MD: 325.1) significant decrease was observed. An increase was observed in the daily sitting times (MD: -178.1) (p<0.001) (**Table 2**).

According to the IAS results evaluating internet addiction, it was found that the pandemic statistically significantly increased internet addiction (MD: 31.7) in university students (p<0.001). In addition, it was determined that the number of individuals addicted to the internet increased from 2 to 22, the number of possible addicts increased from 26 to 169. In contrast, the number of non-addicted individuals decreased from 177 to 14 (p<0.05) (**Figure 1**). Finally, the time spent on the internet during the day (MD: 1.46) was also found to increase significantly with the pandemic (p<0.001) (**Table 3**).



* Ki-Square

Figure 1: Change of internet addiction status over time

When HLBS sub-parameters were compared before and during COVID-19, a positive change was observed in health responsibility (MD: 1.88; p<0.001). There was an adverse change in physical activity (MD: -4.9; p<0.001), nutrition (MD: -3.26; p<0.001), spiratual development (MD: -0.96; p: 0.004) and total score (MD: -6.82; p<0.001) and this change was statistically significant (p<0.05). There was a positive change in interpersonal communication (MD: 0.09; p:0.915) and stress management (MD: 0.61; p:0.060), but this did not result in a statistically significant difference (p>0.05) (**Table 4**).

DISCUSSION

The aim of this study was to compare physical activity, internet addiction and healthy life behaviors in university students before and during the pandemic. In general, it was determined that the physical activity time of the students decreased, the time spent sitting increased, they spent more time on the internet, and their healthy life behaviors decreased during the pandemic period compared to the everyday life period.

The findings of this study revealed that vigorous and moderate exercise and walking time decreased and sitting time increased with the pandemic in all participants. Ammar et al.[17] reported that, in general, people spent more time at home during the COVID-19 quarantine, leading to an increase in sitting time, a change in lifestyle and a decrease in time spent on physical activity. Conversely, studies show that more time is spent on physical activity.6 This difference in the studies may be due to various factors such as the social environment of the individual, whether the environment in which the individual lives is suitable for exercise (house with a garden, complex with a gym, etc.) and the culture of exercise.[3-18]

In fact, staying at home for long periods of time can lead to sedentary behaviors by increasing sitting and screen time (video games, TV viewing, mobile device use).[7] The negative consequences of the reduction in physical activity observed during the COVID-19 pandemic affect both physical, mental and social health. In addition, low levels of exercise reduce immune competence and regulation, increasing the risk of developing systemic inflammation.[19] Thus, it is inevitable that the risk of chronic diseases will increase, and the individual will become vulnerable to COVID-19. For this reason, it is recommended to maintain a healthy physical activity level during and after the pandemic with simple and easily

Table 2. International Physical Activity Questionnaire – Short Form (IPAQ-SF) scores before and during pandemic.

	Before COVID-19		During COVID-19				
	Mean	SD	Mean	SD	MD	Z	p*
Minutes of vigorous PA	33.9	90.8	5.6	21.5	28.4	-5.584	<0.001
Minutes of moderate PA	50.8	112.1	3.15	12.2	47.7	-7.123	<0.001
Minutes of walking PA	352.8	297.0	27.7	30.4	325.1	-12.359	<0.001
Minutes of daily sitting	478.9	201.7	656.9	195.6	-178.1	-12.365	<0.001

PA: physical activity; MD: Mean Difference; SD: Standard Deviation

Table 3. Internet Addiction Scale (IAS) and daily internet usage time before and during pandemic.

	Before COVID-19		During COVID-19				
	Mean	SD	Mean	SD	MD	Z	p*
Internet Addiction Scale	26.10	13.68	57.81	12.38	31.7	-12.417	<0.001
Daily internet usage time (hour)	3.12	1.65	4.58	1.75	1.46	-11.435	<0.001

MD: Mean Difference; SD: Standard Deviation

Table 4. Scores for the Subscales of Healthy Lifestyle Behavior Scale before and during pandemic.

	Before COVID-19		During COVID-19				
	Mean	SD	Mean	SD	MD	Z	p*
Health responsibility	19.72	3.97	21.60	3.73	1.88	-5.057	<0.001
Physical activity	17.83	4.05	12.93	2.89	-4.9	-12.382	<0.001
Nutrition	19.94	3.44	16.68	3.31	-3.26	-12.483	<0.001
Spiritual development	23.51	3.86	22.54	3.78	-0.96	-2.901	0.004
Interpersonal relationships	24.85	3.58	24.94	3.83	0.09	-0.107	0.915
Stress management	19.20	3.17	19.81	3.53	0.61	-1.878	0.060
Total score	125.38	15.54	118.56	10.34	-6.82	-6.409	<0.001

MD: Mean Difference; SD: Standard Deviation

applicable exercises such as walking, lifting and carrying objects, climbing stairs, standing, etc. that can be done at home. In addition, with the recently developing technology, many e-Health and exercise applications can be used to encourage physical activity through the internet, mobile technologies and television.[20]

Our study determined that the level of internet addiction and the daily time spent on the internet increased with the pandemic. It was also observed that most participants were not addicted to the internet before but developed addiction during COVID-19. Many studies in the literature support our study and show that internet addiction and usage time increase in adolescents and university students during the pandemic and especially during the quarantine period.[18-21] COVID-19 has drastically disrupted the daily lives of people worldwide, while increasing the length of stay at home and the use of digital entertainment during lockdown. Internet addiction became an issue during the lockdown period, becoming a significant problem that could emerge post-pandemic, especially among university students.[22] Although the pandemic is over, the effects of the pandemic on internet addiction should be further studied, and social measures should be taken, as the impact of the pandemic on internet addiction will negatively affect the development of young people.

In our study, we observed a positive increase in health responsibility awareness and a negative decrease in physical activity, nutrition, spiratual development and total score with the pandemic. Improving health depends on a positive change in healthy lifestyle behaviors such as health responsibility, regular and adequate physical activity, good nutrition, self-actualization, interpersonal support and stress management.[23] Studies in the literature reveal that the pandemic has negative effects on healthy living behaviors in general, except for some sub-parameters.[24,25] In Ke et al.[24] no change was observed in health responsibility, nutrition and personal support sub-parameters, while other sub-parameters and total scores decreased with the pandemic. In the study of Ashgar et al.[25] a negative change was observed in all sub-parameters, including the total score. This difference between the studies is thought to be due to various factors such as the age of the participants, the environment they live in, the family's average income, the parents' educational level and cultural differences.[6]

Several limitations of our study should be considered. First, the fact that it was an observational study and all subjects volunteered to participate in the survey may cause bias in participant selection. Secondly, the evaluation of physical activity with a questionnaire, not with objective tests. Finally, the inclusion of individuals who have unknowingly acquired Covid may be a limitation of this study. Performing a real physical activity assessment using an accelerometer would have made the work-out more powerful. This may be useful to provide insight for future research. In addition, as far as we know, the strength of this study was that it was the first study to compare physical activity and internet habit behaviors of university students before and during the pandemic.

CONCLUSION

In this study, it was observed that physical activity, internet usage habits and healthy lifestyle behaviors changed while university students were deprived of their social and social environment due to the physical restrictions applied during the ordinary pandemic period. It was observed that the pandemic caused a decrease in the participants' physical activity level and an increase in the duration of daily sitting and internet use. As a result, more efforts should be made to create strategies that will motivate students to maintain a healthy lifestyle in all aspects (exercise, physical and mental health, etc.) during the pandemic and/or in a similar situation. Particular attention should be paid to participating in physical activity and reducing the duration of sitting and internet use, and social measures should be taken against the risk of this situation occurring after the pandemic.

ETHICAL DECLARATIONS

Referee Evaluation Process: The study was carried out with the permission of the Gazi University Clinical Researches Ethics Committee (Date: 10.11.2020 Decision No: 129778) and (E.129778) and the Ministry of Health of the Republic of Turkey (2021-06-10T23-03-50).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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